Handling Cotton Planting-Seed at COTTON GINS

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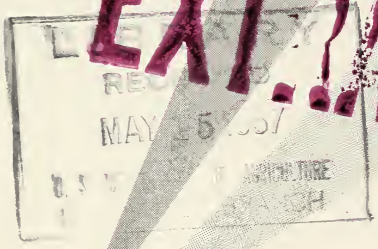

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HANDLING COTTON PLANTING-SEED at COTTON GINS

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Cotton planting-seed usually is delinted and treated in the storage period between the time of ginning and the next planting season. During this period, ownership of the planting-seed remains with the producer.

About 350,000 tons of cotton planting-seed are required annually in the United States, in addition to emergency replanting demands. Both large and small producing communities are frequently in need of information on the best handling methods.

This publication describes methods of handling cotton planting-seed (including storage, bulk cooling, grading, cleaning, delinting, and treating) that are gradually coming into use at cotton gins where purity and preservation of the seed are important adjuncts to sales. The methods are applicable on the farm as well as at the gin. All are safeguards against hazards of foreign matter, excessive moisture, plant diseases, and other causes of loss in quality. Each method may assume special importance to cotton producers in meeting regional variables encountered in the preservation and improvement of quality. Several layouts and simple designs are included.

The cleaning, culling, and grading methods described apply in general to all types of delinting, but the section on treating applies only to mechanically delinted and undelinted planting-seed.

The well-known use of bulk-storage seed houses at cotton gins is not covered in this publication; neither are chemical delinting methods, such as wet-acid and dry-acid methods, because they pertain to larger commercial operations than are usually found on small farms and at cooperative centers.

STORAGE

The necessary shelter for cotton planting-seed usually is provided in regular storage houses. Table 1 gives the capacity of storage houses of various dimensions.

TABLE 1.—*Capacity of cottonseed storage houses of various dimensions* [1]

Inside width (feet) [2]	Capacity per linear foot	Capacity, when length of house is—									
		20 feet		40 feet		60 feet		80 feet		100 feet	
	Tons	*Tons*	*Bushels*	*Tons*	*Bushels*	*Tons*	*Bushels*	*Tons*	*Bushels*	*Tons*	*Bushels*
18	1. 8	36	2, 300	72	4, 600	108	6, 900	144	9, 350	180	11, 500
20	2. 0	40	2, 600	80	5, 200	120	7, 800	160	10, 400	200	13, 000
22	2. 2	44	2, 850	88	5, 700	132	8, 550	176	11, 400	220	14, 250
24	2. 4	48	3, 100	96	6, 250	144	9, 350	192	12, 500	240	15, 500
26	2. 6	52	3, 400	104	6, 750	156	10, 150	208	13, 500	260	16, 900
28	2. 8	56	3, 650	112	7, 300	168	10, 900	224	14, 550	280	18, 200
30	3. 0	60	3, 900	120	7, 800	180	11, 700	240	15, 600	300	19, 500
32	3. 2	64	4, 150	128	8, 300	192	12, 450	256	16, 600	320	20, 800
36	3. 6	72	4, 600	144	9, 200	216	13, 800	288	18, 400	360	23, 000

[1] Based on loosely packed seed (estimated volume, 80 cubic feet per ton). Tightly packed seed has an estimated volume of 71 cubic feet per ton.
[2] Plate height, 19 feet; average depth of seed pile, 8 feet.

COOLING AND AIRING

The type of construction used in the storage house will dictate the choice of cooling system. Enclosed sheds with wooden floors are common; some are provided with crawl underspace, and some have a hall between two rows of bins. Another type of storage house is elevated on sturdy posts above a driveway, so that trucks may drive under the storage space and receive seed through trapdoors. A third type, for storing seed in either bulk piles or bins, consists of a metal-sheathed shed erected on a concrete slab. The slab may be on the ground, or it may be on footing walls and earth fill. In the latter, underfloor laterals from a centrally located suction tunnel, either above or below floor level, may use suction holes through the floor for cooling and airing the seed.

Several good systems are shown in figures 1 to 4. Each is satisfactory; loss of seed is extremely low in such installations.

Expanded services during the period between planting and harvesting are possible if the storage house has a removable grid floor or laterals (as shown in figs. 1 to 4), with dampered suction piping (as shown in fig. 5). Other seeds and grains can be handled readily with the cooling apparatus, but methods of filling the storage space may differ.

In planning for air delivery or suction systems for cooling cottonseed in bins and drying it without heat, the element of time and the initial moisture content of the seed are important. For safe storage the moisture content of the cottonseed should be reduced to 12 percent.

As a rule of thumb, a No. 35 cotton-gin fan with 18 blades will deliver 3,500 cubic feet of air per minute against a resistance of 5 inches (as shown on a U-tube water-pressure gage) at a speed of approximately 1,333 revolutions per minute (table 2). A No. 35 fan

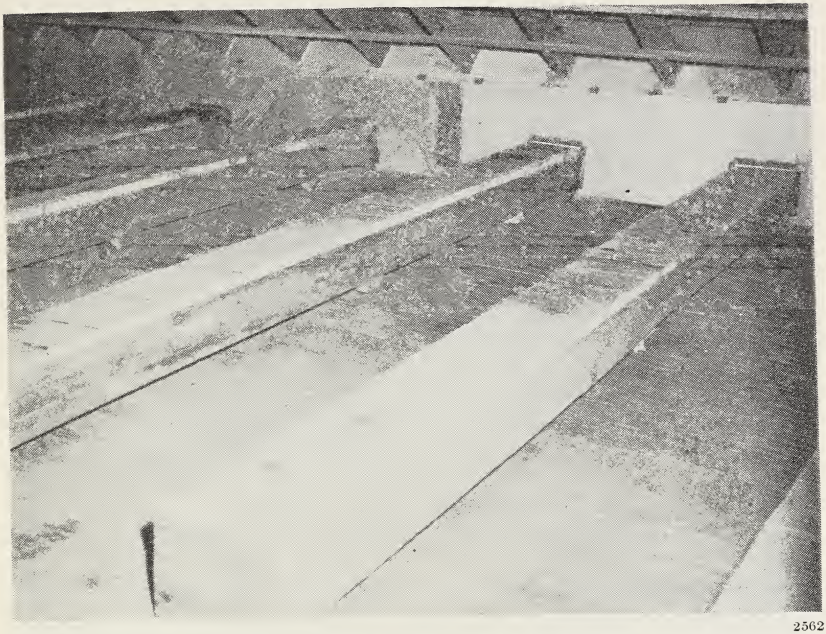

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FIGURE 1.—Removable box laterals, 4 feet apart on centers, plugged into a side tunnel or suction trunk.

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FIGURE 2.—Removable grid or lattice floor, with side tunnel or suction trunk. This system can be used for either bulk or sacked seed.

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FIGURE 3.—Removable grid or lattice floor, with seed stored in sacks for air cooling and drying.

with 6 or 8 straight blades and a fan wheel 32 inches in diameter will deliver 3,500 cubic feet of air at a speed of about 1,000 revolutions per minute.

Fans should be operated on sunny days between 10 a. m. and 4 p. m., which is usually the period of lowest humidity. Operation of a fan for 2 hours as described above should remove 1 percent of moisture from 1 ton of damp seed. If a bin has 10 tons of seed in it, the fan must be operated 10 times as long, or 20 hours, to remove 1 percent of moisture. Thus, if one knows the approximate moisture content of the seed, he can estimate by simple arithmetic the total number of hours the fan will need to be operated for a given quantity of seed.

At a given speed, the volume (cubic feet of air delivered per minute) of a centrifugal fan increases as the resistance it has to overcome decreases, and there is a corresponding increase in horsepower consumption. Therefore, the type of cooling fan and size of motor are of major importance in the satisfactory and economical operation of a cooling system. Backward pitch blades to fan wheels with load-limiting characteristics are the advisable types to choose. Also, it may be advisable to consult cotton-ginning specialists of the U. S. Department of Agriculture regarding fan problems.

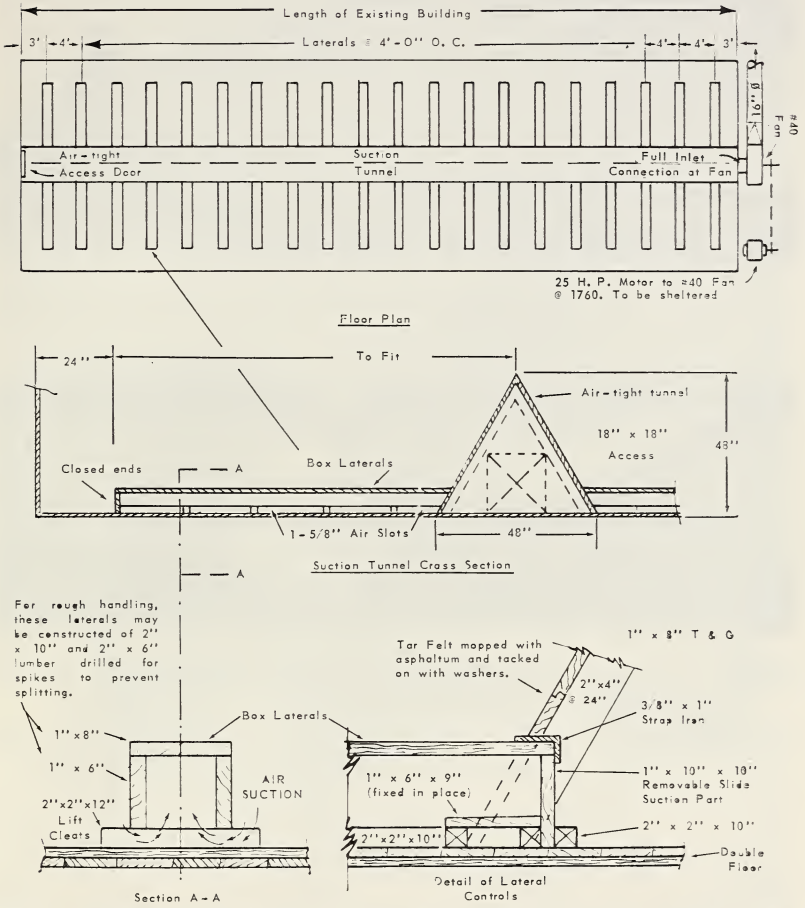

FIGURE 4.—Diagram of central triangular tunnel and laterals for seed storage. If side access doors are provided at intervals, a seed belt or auger may be used within the tunnel to empty any part of the seed house.

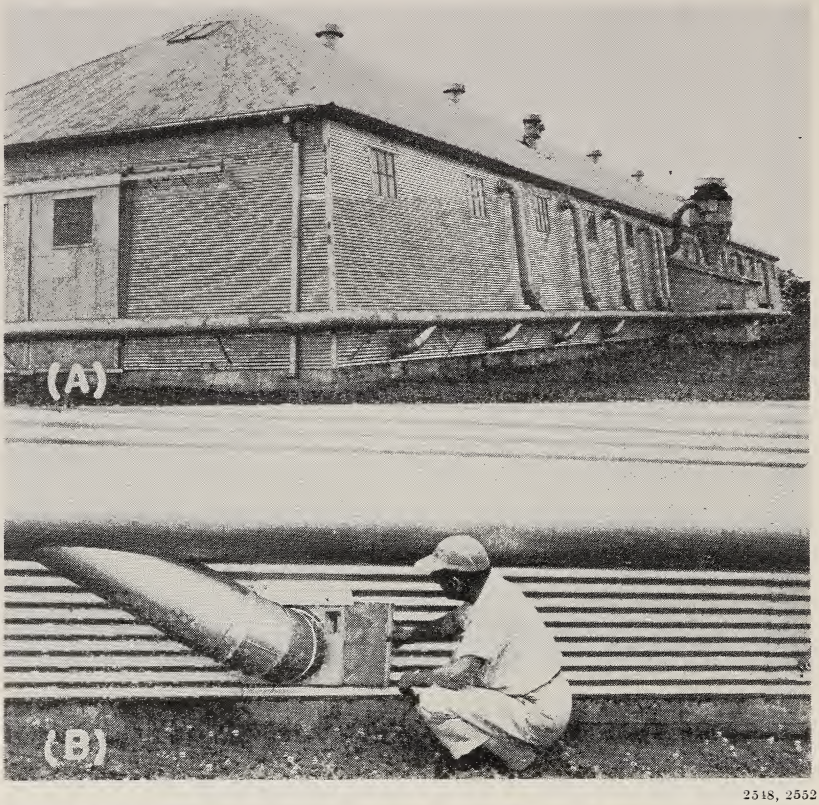

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FIGURE 5.—(A), Suction piping for cooling planting seed in bins; (B), a dampered connection to one of the bins.

TABLE 2.—*Comparative data on cotton-gin fans of different sizes for drying seed in piles or bins* [1]

Type of fan	Fan wheel		Revolutions per minute	Volume [2]
	Blades	Diameter of wheel		
Type C: [3]	*Number*	*Inches*	*Number*	*Cubic feet*
No. 35	18	23. 5	1, 333	3, 500
No. 40	18	27	1, 126	4, 000
No. 45	18	30	1, 000	5, 100
No. 50	18	33	906	6, 252
Plain: [4]				
No. 35	6 or 8	32	1, 000	3, 500
No. 40	6 or 8	32	1, 000	4, 000
No. 45	6 or 8	32	1, 000	5, 000
No. 50	6 or 8	32	1, 000	8, 000

[1] Based on a seed-pile depth of 8 feet.
[2] Air delivered per minute against an estimated resistance of 5 inches as measured on a U-tube water gage.
[3] Courtesy of Clarage Fan Co.
[4] Courtesy of Boardman Co.

DELINTING AND TREATING

All "gin-run" seed should be cleaned, to remove lightweight seed and trash, before it is delinted and treated. For low cost and best operation, grading, culling, and cleaning should be followed by delinting and treating in a continuous operation. To prevent rehandling, there should be a reasonable working balance in the relative capacities of graders, linters, and treaters.

Several kinds of satisfactory cottonseed graders, cullers, and cleaners are on the market. A few typical ones are shown in figures 6 to 8. In some communities, the equipment is mounted on trucks to make it portable.

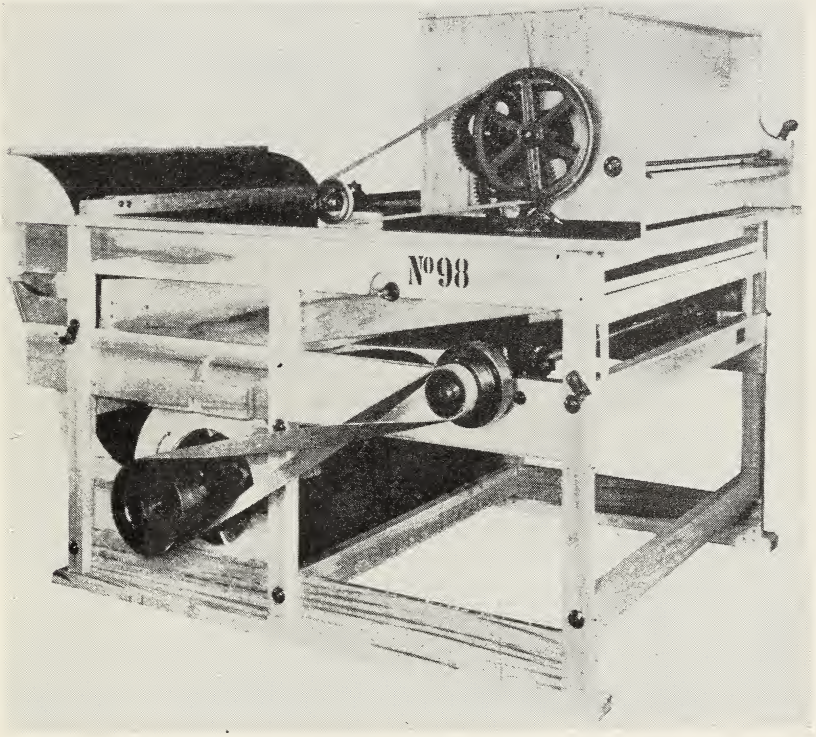

FIGURE 6.—Rough cleaner for cleaning undelinted or mechanically delinted cottonseed. (Courtesy A. T. Ferrell & Co.)

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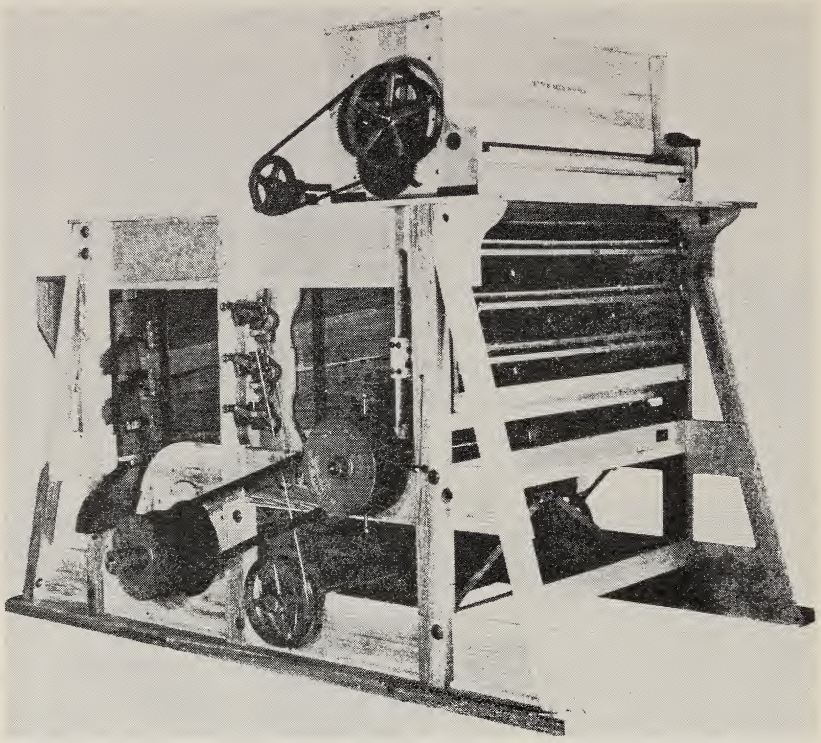

FIGURE 7.—Improved cleaner for cleaning undelinted or mechanically delinted cottonseed. (Courtesy A. T. Ferrell & Co.)

Figure 9 shows a layout for a 2-linter system suitable for a community plant for delinting and treating cotton planting-seed. From 1 to 4 delinting machines could be used in such an arrangement. Numerous other systems have been used in individual communities to suit the spaces and structures available.

Mechanical delinting machines

The fuzz and other short fibers that adhere to the cottonseed after ginning (called linters) usually are removed from the seed at the oil mill to make it easier to extract the oil. The machines (also called linters) that are used to delint the cottonseed have gradually increased in size from 106 saws per linter to 141, and then to 176. Thus, new and used equipment for delinting cotton planting-seed is available in three sizes.

Mechanical delinting machines with 141 saws range in capacity from ½ to ¼ pound of cotton linters per saw per hour, or approximately ¾ bushel of planting-seed per hour for each 10 saws.

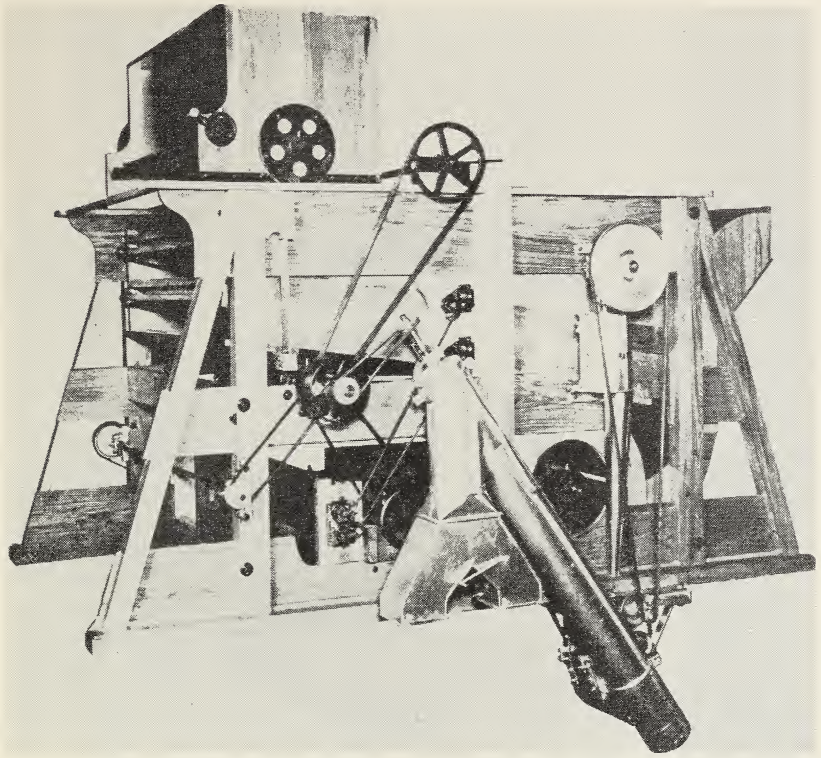

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FIGURE 8.—Combination cleaner and mercurial dust treater for cotton planting-seed. May be used on either undelinted or mechanically delinted seed. (Courtesy A. T. Ferrell & Co.)

Mechanical delinting machines and cotton gins have many similar elements, as shown in figure 10.

In 1940, a small linter was constructed in the shops of the United States Cotton Ginning Research Laboratory at Stoneville, Miss. It was made from a hand-powered cotton-gin stand of the export type. A 20-saw gin thus converted to a linter should delint about 3 bushels of seed per hour.

Successful community delinting and treating plants are operating in each region of the Cotton Belt. Some of these plants are using discarded linter machinery from local cotton-oil mills. Figure 11 shows two community plants for delinting and treating cotton planting-seed in the Southeastern States.

Overhead distributors to linter feeders and linters may be either belt-type or auger-type conveyors. The latter combine self-cleaning lifts with horizontal runs.

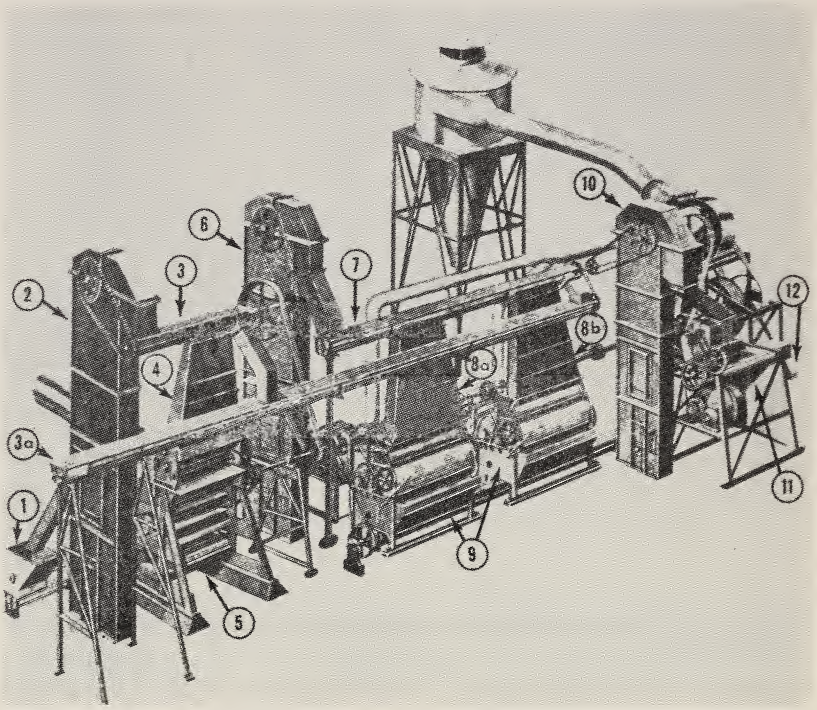

FIGURE 9.—A conventional 2-linter system for culling, grading, cleaning, delinting, and treating cotton planting-seed. Raw cottonseed is unloaded into the hopper (1), and lifted by elevator (2) to the conveyor (3), which supplies the feeder (4), and cleaner-grader (5); the cleaned seed passes to the elevator (6), then along the conveyor (7), to the linter-feeders (8a and 8b) and linters (9). The delinted seed passes from the elevator (10) to the treater (11), where it is treated with mercurial dust. The treated seed is discharged at the sacker (12). Surplus seed that overflows from the feeders (4 and 8) is returned to the hopper (1) by the conveyor (3a).

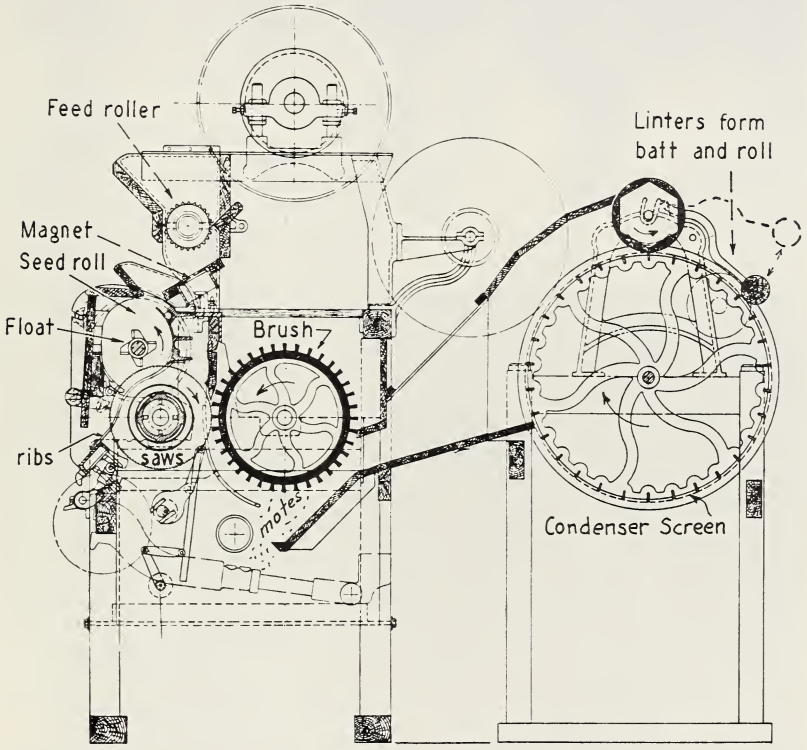

FIGURE 10.—Cross-section of mechanical delinting machine, with unit condenser. (Courtesy Carver Cotton Gin Co.)

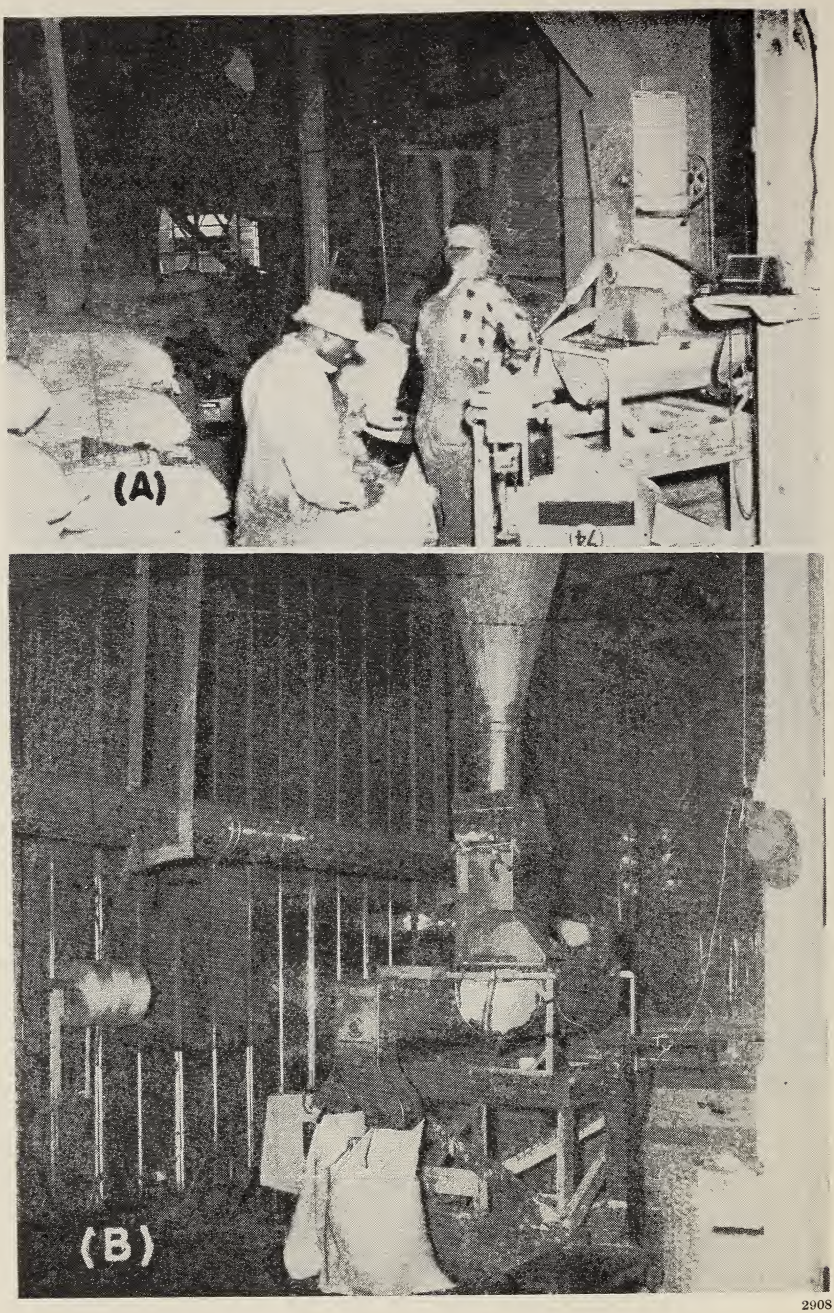

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FIGURE 11.—(*A*), Community delinting and slurry seed-treating plant in the southeastern part of the Cotton Belt; (*B*), another installation of a slurry seed-treating machine.

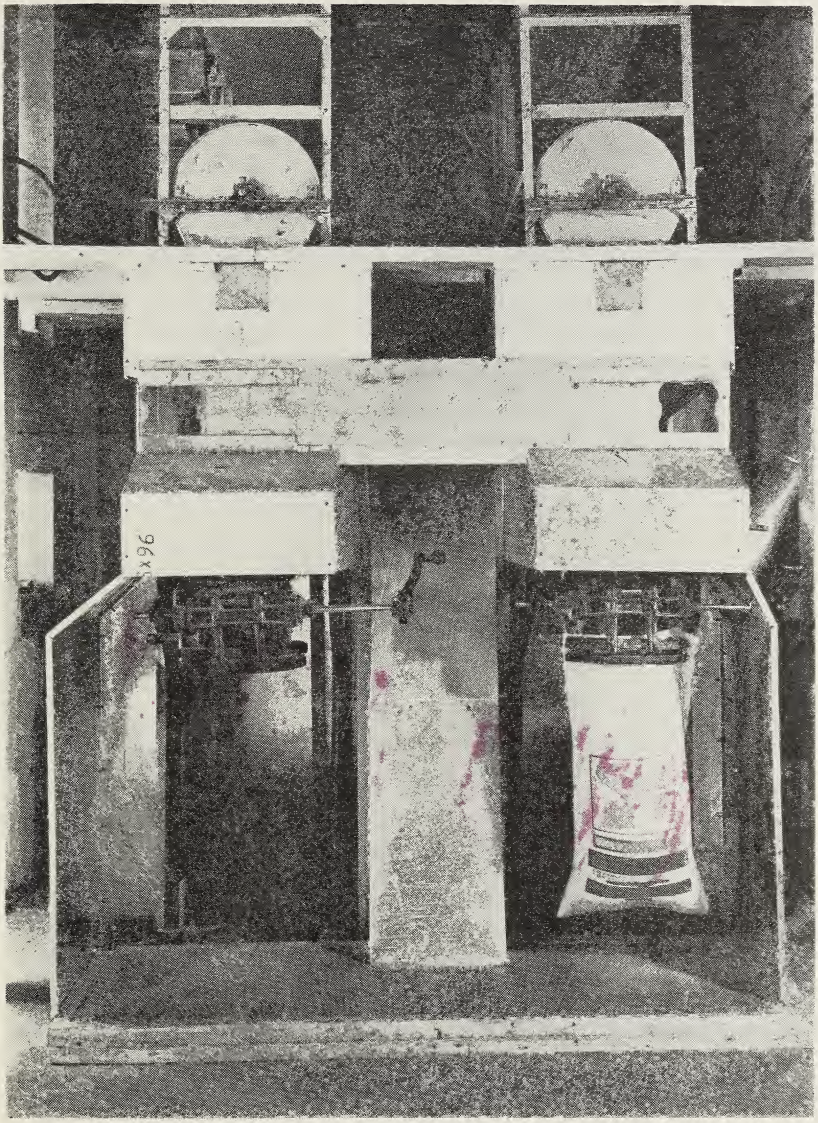

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FIGURE 12.—Front view of mercurial-dust seed treater showing effective ventilation at the sacking station.

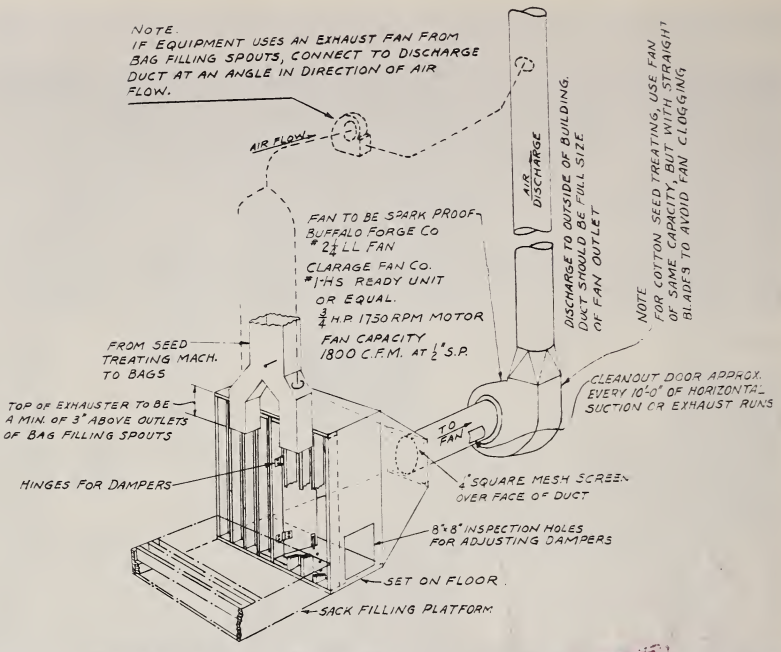

FIGURE 13.—Isometric sketch of seed treater shown in fig. 12 with panels removed from sides of platform.

TREATING SEED WITH MERCURIAL DUSTS

The "slurry" method of treating cottonseed is gaining in popularity and effectiveness. In this method, the poison dust is mixed with water, and the mixture is then applied to the cottonseed in the proper quantities. It is not necessary to dry the seed after treatment, as only a very small quantity of water is used; at the same time, harmful dusts are completely eliminated.

One kind of poison-dust seed treater is shown in figure 6 and another in figure 11. Others are on the market (figs. 12 and 13). They use various methods of drawing off surplus dust-laden air.

POWER REQUIREMENTS

Power requirements for each linter and feeder range from 10 to 15 horsepower; for the overhead distributing system, from 5 to 7½ horsepower; for fans, an estimated 4 horsepower; and for seed-treating machines equipped with fans, ¾ to 3 horsepower. You can usually obtain full information on power requirements of delinting and treating equipment from the manufacturer. Also, Extension Service specialists may be in position to furnish power layouts in their respective areas.

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